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Process for the removal of carbonyl sulfide from liquid petroleum gas

Low cost, energy saving method for removing carbonyl sulfide (COS) from natural and propane gas streams

Description

Liquefied petroleum gas (LPG) is an important fuel and chemical feedstock. It is generally derived from two primary sources: the refining of crude oil, and as a by-product of the production of natural gas. The primary constituent of commercial LPG is propane, although other organic constituents are present as well. Many sources of LPG contain organic sulfur compounds. Some of these, such as hydrogen sulfide, must be removed to a level of 5 ppm or lower to make the LPG merchantable. Other sulfur compounds such as carbonyl sulfide (COS) were once considered to be relatively innocuous, but are now recognized as being problematic for a variety of reasons. This technology uses p-t-butylcalix[4]arene to remove COS from LPG and natural gas streams by forming a complex between COS and the calixarene. The calixarene:COS complex can subsequently be converted back into its component parts using thermal desorption technology, and the regenerated calixarene can be used again to remove more COS from impure gas streams. This method is less energy intensive and more economical than other separation technologies such as distillation.

Applications

- **LPG purification**
  Producers of natural gas and LPG need to remove impurities especially those containing sulfur as their presence leads to fouling of equipment through clogging and corrosion. LPG end-users require high purity LPG for applications including indoor forklifts, propane-powered vehicles, and certain fuel cells.

Advantages

- **COS removal**
  This technology has the ability to remove COS from both natural gas and propane gas streams, and can do so in a way that regenerates the calixarene material that chemically and mechanically separates COS from these gas streams. This approach is competitive with existing methods, and there is belief and may be more cost-effective and less energy-intensive than existing treatment processes.

Abstract

A method for the removal of carbonyl sulfide from liquefied petroleum is disclosed. Removal of carbonyl sulfide is accomplished by contacting a liquid petroleum gas stream containing a carbonyl sulfide as an impurity with a calixarene complexing agent as the principal agent for the removal of the carbonyl sulfide.

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References

- U.S. Patent # 6,334,949 issued 01-01-2002, expires 01/31/2021
- Docket: 98-030US

Status of Availability

This technology is available in the public domain.

Last Modified: 02/04/2010